Automated Bakery Management System

S.A.A. Ravishan[1], E.M.A.I.B. Ekanayaka[2], B.M. Edirisinghe[3], N.H. Manimendra[4], D. I. De Silva[5] and S.M.D.T.H. Dias[6]

[1]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA
[2]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA
[3]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA
[4]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA
[5]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA
[6]Faculty of Computing, Sri Lanka Institute of Information Technology, New Kandy Rd, Malabe, SRI LANKA

[1]Corresponding Author: avishk678@gmail.com

ABSTRACT

Providing an automated system to manage the workload of 'Puzzle' is the objective of this research. 'Puzzle' is a bakery in Sri Lanka. They have been using a handwritten manual system from the origin of the company. They have been able to manage the crowd in the beginning, but with the growing customer crowd, they are having trouble in handling their day-to-day workload. Since it is easy, efficient, and effective to have an automated system, they desperately wanted one for their shop. They also mentioned that they do not need a complex system at the beginning since they are used to make use of a manual system, and they wanted to take things slow. After getting used to the new, automated system, they might ask us to add new, complex functionalities such as attendance marking, salary calculation, leave management and such. 'Puzzle' asked us to add three user types namely, admin, employee, and customer. Using the respective functionalities to each role, will be beneficial for the shop and its users.

Keywords-- Bakery, Online, Management System, Delivery, Order

I. INTRODUCTION

Puzzle Bakery is a well-known bakery in Sri Lanka which has been originated in 1982 and never has been out of business ever since. From the early days, the shop has been maintaining their orders, menu items and employee details as handwritten documents.

As the business grew rapidly, they had to be more efficient and more cost effective. Managing handwritten documents are expensive, time consuming, lacks confidentiality, and it delays the process of responding [2]. To overcome these issues, they decided to move on to an automated system where they can complete most of the handwritten tasks with a few buttons clicks.

As a solution, we have proposed an automated system where the shop can easily manage their workload and address the issues are raised by the handwritten documentation. This automated system can help the business to become more efficient, simply by using more user-friendly interfaces and simple processes.

Diving deeper into details, the admin role will be played by the shop owner where they can add new items to the menu, view, delete and edit existing items. Admin is also able to view the reviews posted by the customers and can delete the unnecessary posts. Employee registration is also done by the administrator. In the admin dashboard, they can view the count of food items, orders, registered customers, and registered employees. Deletion of employee profiles is also done by the admin. Registered employees are displayed in a table view where a search function is also available. The admin can edit the registered employee details using the edit function given in the table view. Registered customer list can be viewed, and unwanted accounts can be deleted by the admin. Using the given search function, the admin can search for a specific customer by name. Orders from customers are displayed in a list where admin can mark them as 'Pending' or 'Completed' orders. A single item in the order list can be viewed separately. After viewing separate order, the admin can print it and give it to the customer which they can provide it to the employee and get the ordered food. Also, the admin can view the feedbacks provided by the customers and delete if there are any unnecessary reviews. Those are the administrator privileges of this automated system. As for the employees, they can add new food items, as well as view, edit and delete existing items. Every employee is capable of viewing and generating a report of all the employees. Finally, as the last type of users, customers have their own functionalities as well. They can view the food menu and place their orders. Also, customers can provide a feedback and view other feedbacks as well. A customer can delete their own review if needed. These are the solutions that we will be providing to optimize the services of this shop.

II. RELATED WORK

Right through this paper simply discussed about how the computer-based information system can help and organize the bakery in an efficient way to increase the productivity of the employees and slowly move out from handwritten manual system. The system that has been proposed is basically divided into admin, employee and customer and will be commonly used platform for all users.

There are systems committed to this issue that offer online solutions for the relevant issues [1]. Most of the functionalities this paper discusses are available in those systems. Looking into these systems there are some

commonly displayed factors such as these are break into customer and admin. Admin can be able to view the employee list. With the proposed system the admin will be able to get the total of the employee.

With this automated system there are some benefits for the user. They can place as many orders as they like from the menu and get satisfied there are some systems which are forcing on customer satisfaction [1]. It will greatly benefit both the client and the bakery's expansion [5]. There are some systems which include an alerting option for the customer about the availability of the stocks in the menu [1].

The issue of misplacing or losing handwritten data has also been a major issue in the past [2]. Data can be easily misplaced or lost and can be easily altered and manipulated. There is no easy way to search them, and it is risky to have them in books since everyone has access to the book. It is the same problem that has been plaguing the puzzle bakery due to data manipulation and data loss, which has led to the puzzle bakery losing quite a bit of revenue as a result.

As a result of overstocking their shelves and wasting food chain retail businesses suffer severe financial losses as well as food losses [3]. In terms of the proposed system, there are no logistical areas that would assist in reducing the amount of food that will be wasted. This type of single-store logistic management is carried out in a manner that is simpler and easier for the shop owner.

As part of the proposed system, employees and admins will be able to see what is being ordered by the customer at any given time. It should be mentioned here that there are also some systems in Japan that have the same ability to be able to see what the customer is ordering at the movement [4]. This will result in a greater level of efficiency and effectiveness on the part of customer service in the future.

III.   METHODOLOGY

An automated systems must be simple to use because today world is waiting for simple and easy things. In a bakery order placing system, we need to get a clear idea on the environment of a bakery.

The customer and the bakery workers play a major role in the current environment. And there is an Admin to the system. In the *Figure. 1*, the chart shows the basic bakery environment. By the way, we need to study the pattern of the bakery before build the system. Also, don't forget to analyze the previous order placing efficiency.
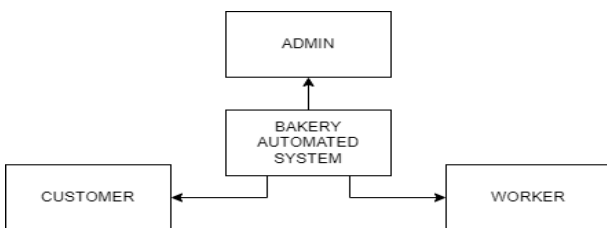

Figure 1: Bakery Environment

When we turn our attention to the bakery, it might be a busy place to manage all their orders. Therefore, a simple and user-friendly solution is required for places like bakeries. In the other way, the system must be easy to edit from the IDE because the clients will ask to add or edit some features as well as the interfaces of the system.

A.   Tools and Technologies.

The System is planning as a client-server architecture with the admin and worker. They have the access of the center server hosted database [2]. Frist the developer can use Adobe XD or Figma to develop the user interfaces. The user interfaces must be simple and include the planned functions of the bakery system.

Visual Studio Code can be used as an IDE by developers. because it is an open-source, entirely free IDE. With its integrated Git, debugging tools, and a variety of extensions to expand its functionality, Visual Studio Code has a strong interface that is packed with features.

There are many programming languages. Among them, Laravel & PHP is more convenient programming languages that will be used to implement to this platform. Because it is easy to handle the system.

In the other way, GitHub is very useful to the team because every team member can implement the system easily. As the *Figure. 2* depicts, the GitHub branches should be Item Management, Order Management, Employee Management, Development and Main branches. The developers can push the program to the related branch and then, they can merge it to the Development branch. When the developer needs a pull the developed program, it will be easy from the Development branch because it will have the final merge program. After all process completed the developers can merge the Development branch to the Main branch.
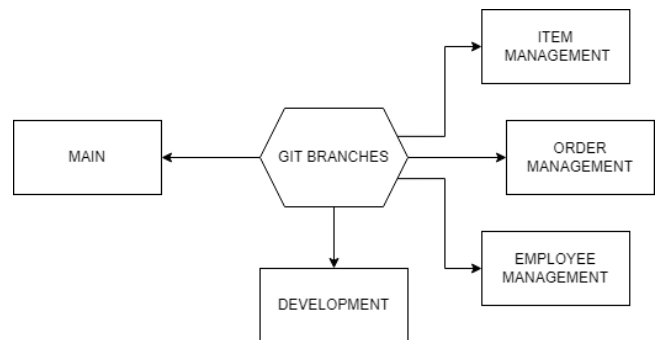

Figure 2: GitHub Branches Structure

B.   Backend Processes

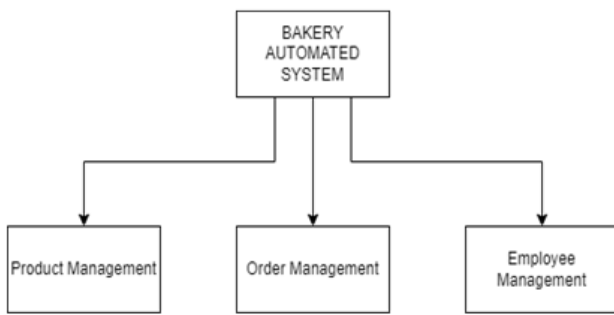*Figure. 3*, Depicts the Major backend functions of the Automated bakery system.

Figure 3: Main Functions

1. Add / Update / Remove & Search Product Items

When we move on to the system, there must be a function to add the items. There are some fields to add such as Item Name, Item No., Ingredients, Quantity, Price, and Image of the Item.

Those added items must be editable because there may be some changes of the items. In the other way, if some products may not be available the owner must have access to remove them from the system.

The search function is a must to the system because it will help to increase the efficiency of the proposed system. The user can easily get the item details and order them via searching relevant item form the system.

2. Customer Orders Handling

This is a major part of the system. There is an item list in the proposed system. The list includes all available items of the bakery. Also, there is a function to search relevant items. However, the user can order items via tap on the item card in the list. When the user taps on the item card, it will add to a cart. There will be an option to change the quantity and add another item, if needed. It is just a simple process to follow in the system.

3. Generate Reports & Manage Employee Details

Employee Management is a general requirement for the system. In this function, the bakery has a clear identity of employee data, and it will help to optimize the system.

IV.   PROPOSED SYSTEM

The Laravel & PHP platform is the foundation for the suggested model of the bakery management system. The proposed model is logically divided into three sections: administration, employment, and customer. These are grouped in a way that makes the management of the entire bakery, which is complex, easier to maintain by dividing it into three smaller categories [1]. Refer *Figure. 4* for further understanding.
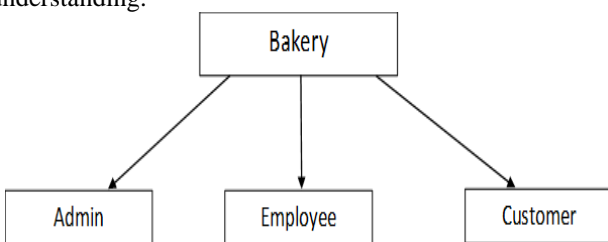

Figure 4: System hierarchy

The primary objective of this suggested model is to address the shortcomings of the current model and simplify the process of managing a bakery. The following is a discussion of several significant software updates:

A. Importance for Management

The complexity of managing a business is highlighted by this software, which also has options for employee management, product management, customer records, and keeping track of a bakery's daily expenses [1]. A typical management software includes management options like stock management, employee management, etc.

B. Customers

In any business organization, the customers come first because a company cannot function without them. As a result, offers and discounts are given to customers based on their past purchases. Here, a customer database is created, and each time a customer purchases products, the total cost of those purchases is recorded in the database. By tracking this information, the admin can provide specific customers with special offers and discounts based on the value of their purchases. As a result, customers are more satisfied and feel more connected to the business [1].

C. Reducing Paper Usage

Reducing the use of paper is one of the main objectives of this proposed model, and it has been accomplished in many areas, such as the absence of paper in reports, invoices, and orders. The administration retrieves the customer records, gathers the customer's e-mail address, and mails the bill to him every time he requests a bill. This example illustrates how the usage of paper in billing is reduced. As a result, the company uses significantly fewer papers, which aids in its environmental transition [1].

V.   DISCUSSION

In this system, the user inputs are used to search records. This function will be helpful in increasing the efficiency of the system. Without manually searching through long lists, users are given the privilege to search records simply by entering their desired record name [1]. For instance, entering the customer's name as an input, and as the result, all the information about the customer will be generated. For a better understanding, see *Figure 5*.
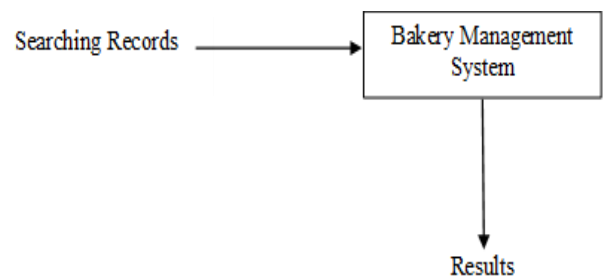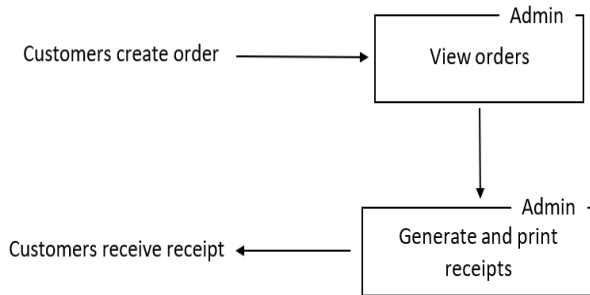

Figure 5: Search function

Unlike handwritten receipts, automated, printed are more accurate and less time consuming. The customer can order food using the respective interfaces and then the admin is able to view and print the order as a receipt. This system has such functions that can aid the company to be more efficient. For a better understanding, see *Figure 6*.

Figure 6: Receipt generation

The administration need not be concerned about data loss or information leakage thanks to this project's advanced security measures for the data. Since all data entries will be saved to a database, there will not be a data loss. Each user of the bakery management system has a unique set of restrictions. The system users and their restrictions are listed below.

A. Administrator

The administrator is given an admin email and password. Upon entering them, an authentication process occurs, and the administrator is permitted to enter if they are sincere [1]. The administrator does not have any restrictions other than editing user order details. Administrator is privileged to use all four sections, including managing customers, employees, orders, and menus.

B. Employee

After the system administrator, the employee has the second-most privileges of the system. An employee is given an employee email and password as user credentials. The two sections, namely Orders management and Menu management, are available to be used by an employee. Employee is restricted from accessing the Customer Management.

C. Customer

Customers are also given an email address and password to access the system. Only one section can be used by the customer to place their food order. Customers can only edit and delete orders. They do not have access to modify or delete anything in the menu.

VI.   FUTURE WORKS

This system that has been proposed is the first phase of many. In this phase our goal is to introduce the users to an automated system where they can complete their desired tasks with ease. This new system is supposed to save time,

money, and resources of both client and the company. We have included only the most basic features to this system just so they can prepare for more upgrades in the future.

The following upgrades are to be made in the upcoming phases.

a)   *Online payment gateway*

In this current proposed system, there is no payment gateway what-so-ever. Although they are using a cash only policy currently, they are hoping to expand their limitations and provide the customers the facility of online payments.

Once the first phase is lunched, the requirement gathering for the second phase will be started immediately. Functionalities, user interfaces and other user requirements will be discussed and implemented in the following sprint.

b)   *Online purchasing functions.*

The proposed system only supports for in premises orders. But, following the online payment functionality, comes the online ordering feature. In the second phase, after adding the online payment gateway, the online ordering functionality will be added to the system.

The goal is to provide customers the satisfaction of ordering their favorite food items within the comfort of their home.

c)   *Delivery system*

Answering the simple question "Does 'Puzzle Bakery' deliver their food?", we are planning to add the necessary functionalities to the system so that the customers can order their food and make the payment, as well as receive their favorite food items to their doorstep, just in a few clicks.

As the requirement of the client, we will be providing the functionalities to make the payment prior or on delivery. The bakery will be hosting the delivery process with an additional fee. If the requirements state that there is a need to track the delivery rider, the necessary functionalities will be added as well.

### d)   *Separate applications for administrator and other users*

Since this is the first hands on experience for the PUZZLE BAKERY to practice an automated system, this proposed system will be the perfect opportunity for them to begin with. The output of the first phase is not at all complex, the users can quickly adopt to the new system.

But, after adding the above-mentioned functionalities, the system will be more complex, and it should be more reliable for the end user.

In a scenario where the application that we launch in phase one gets crashed, even the administrator will not be able to investigate the

issue since they will also be using the same application that has already been crashed. So, after doing some research, as a solution, we found that most companies are using separate applications for main users. Namely, "Uber Company" uses a drivers' application as well as a passengers' application to avoid conflicts as such. It shows in the *Figure. 7* chart.
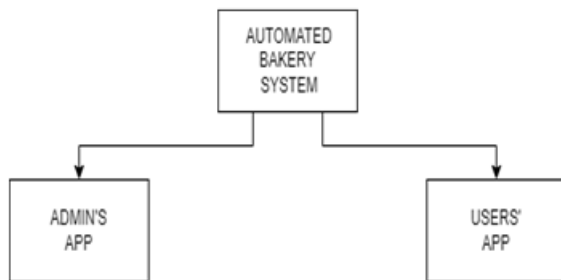
Figure 7: Separate applications for a one system

VII.   CONCLUSION

As one of the well-known bakeries in Sri Lanka, Puzzle Bakery has been operating since 1982 and has never been out of business in the past 30 years. As a matter of fact, the shop has been maintaining the details of its employees, menu items, and orders manually from the very beginning. Because of these reasons the Puzzle Bakery wanted to switch into automated system. As the first step they have switch into a user friendly and straight forward web app.

The bakery will be considerably more structured and effective thanks to our planned software. Employees, administrators, and customers are the three main users of this system. The privilege of deleting employees and customers will be granted to the administrator, who will also be able to make reports and obtain employee and customer lists. The menu can be updated with new foods and unpopular foods can be removed by the administrator. When it comes to the employee, you can create a list of their information and search for them by name. Employees will also have the option of adding new food items to the menu. When it comes to the customer, customer will be able to order food from the app and customer will be able to add feedbacks about the food he had with this app.

With this proposed system the bakery will get much more efficient and organized. With the past handwritten system, the puzzle bakery was having issues with their customer records, employee records and meal order records. With this proposed system the puzzle bakery will be able to organize their reports and will be able to work more productively.

REFERENCES

[1] R. A. G. Karthick.G. (2016). Bakery management system. *International Journal of Trend in Research and Development, 3*(1), 4.

[2] K. Nickson. KIU Institutional Repository. [Online]. Available at: https://ir.kiu.ac.ug/bitstream/20.500.12306/7441/1/img08619.pdf.

[3] AIS eLibrary. [Online]. Available at: https://aisel.aisnet.org/amcis2020/data_science_analytics_for_decision_support/data_science_analytics_for_decision_support/37/.

[4] T. T. A. Takeshi Shimmura. 92009). Real-time process management syetem in a restaurant. *International Conference of Soft Computing and Pattern Recognition,* 4.

[5] A. Nindiani, M. Hamsal & H. H. Purba. (2018). Product and service quality analysis: An empirical study of customer satisfaction in a bakery. *Binus Business Review*, *9*(2) 95–103.